

U.S. Application No. 10/689,716
Response and Amendment dated March 9, 2009
In response to Office Action mailed July 17, 2006

REMARKS

Claims 1-7, 29-34, 41, 42, 44-48, 50-52 were pending and rejected by the Office Action dated July 17, 2006 (the "Office Action"). The Office Action rejected claims 1-7, 29-30, 32-34, 41, 44-48, 50-52 as allegedly being obvious in light of Levy (US Pub. 2004/0088469A1) in view of Stufflebeam (US Patent 6,295,566) and Grimaud (US Patent 5,546,530).

By this Response and Amendment, claims 1, 3, 7, 29, 32-33, 41, 45, and 48 are amended, while claim 2 is cancelled. Claims 8-28, 35-40, 42-43 and 49 were previously cancelled without prejudice or disclaimer. New claims 53-56 have been introduced for examination upon the merits. No prohibited new matter has been introduced by the above amendments.

Applicants respectfully request reconsideration in view of the above claim amendments and following remarks.

I. Claims 1, 2-7, 29-34 and 41, 42, 44-48 and 50-56 Define Patentable

Subject Matter Pursuant to 35 USC §§ 102 and 103

The Office Action rejects claims 1-7, 29-34, and 41, 42, 44-48 and 50-52 under 35 USC §103 (a) as being unpatentable over Levy in view of both Stufflebeam and Grimaud. Insofar as this rejection applies to the claims as presently amended, Applicants traverse as follows.

As described previously on the record by Applicants, the present invention provides a unique motherboard that accepts multiple high performance video cards and coordinates those multiple high performance video cards to provide improved video performance to a display device. As described in the specification of the present application, it is highly desirable to provide a motherboard having multiple high-speed video card slots that are capable of receiving

high performance video cards that can then be operated concurrently. In this way, the present invention allows the leveraging of multiple standard, off-the-shelf video cards without causing or exacerbating the bandwidth problems normally associated with parallel processing over a bus.

The Office Action alleges that Levy discloses high speed video card slots including a scalable interconnect for connecting to a first video card slot and a second video card slot. As noted previously by Applicants, Levy merely states that

The computing device 100 may comprise one or more devices (DEVICES 1-5) such as for example, Ethernet cards, video cards, RAID controllers, SCSI Controllers, ATA disk controllers, PCU bridges, etc coupled to a root device (DEVICE 0) of the chipset 104.

Levy at par. 0016. Applicants submit that Levy fails to disclose or suggest a plurality of high speed video card slots including a first and second high-speed video card slot interconnected to a motherboard via a scalable interconnect and switch system that operate to form distributed links of lanes during operation, as recited in all of Applicants claims as presently amended. Further, as noted previously, Levy does not provide any disclosure regarding the attachment and operation of two or more high speed video cards.

As presently amended, all independent claims, which include claims 1, 41, and 48, have been amended to recite that the scalable interconnect supports a number of interconnect lanes, that the motherboard further includes a switch connected to the interconnect and adapted to convert the interconnect lanes into a plurality of distributed links (a different such link for each slot), and that the switch is configured to distribute the lanes among the links responsive to bandwidth needs during processing by the video cards. The present language of the claims

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makes clear the distinction of the invention over the prior art cited in the Office Action during operation of the motherboard (i.e., during active processing by the video cards, and not merely during startup or other one-time configuration of the machine).

With regard to claim 2 as previously presented (now cancelled due to the current amendments to the independent claims), the Office Action asserted that Levy describes a switch (116, Figure 3) connected to an interconnect (Device 0), wherein the switch distributes bandwidth from the interconnect to the plurality of high-speed video slots [0021, 0017, 0018, 0016]. As noted previously on the record, Applicants disagree with the Office Action's characterization of Levy. The switch 116 does not allocate bandwidth but only assists with turning the device on or off. This is illustrated in Fig. 3 of Levy which shows that each port 1, 2 and X has its own port receiver 116₁, 116₂, 116_X. The Office Action has taken the position, however, that during a device on or off is an allocation of bandwidth to a device.

While Applicants disagree with this characterization of Levy and construction of the term "switch," Applicants nonetheless have also modified independent claims 1, 41, and 48 to include further language defining the configuration and purpose of the switch. In particular, the claims as currently amended now recite that the switch forms distributed links which contain lanes distributed by the switch during operation in response to bandwidth needs of the video cards during processing. In this regard, the all claims in the Application now explicitly make clear what was previously implicit in the use of the term "switch." Namely, that the switch operates in dynamic fashion to allocate and reallocate the available lanes among the video cards as processing needs vary during operation. In this regard, for example, an x24 PCIe interconnect can be connected via the switch to two video cards, each attached to the motherboard (and

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switch) via a x16 lane video card slot. As there are only 24 total lanes available, at maximum capacity one card would be limited to a x8 connection while the other card be able to utilize an extra 18 lanes (i.e., the full remaining 16 lanes) for a x16 connection. The use of a dynamic switch according to Applicants' invention as claimed allows the "extra" 8 lanes to be dynamically distributed (via the claimed distributes links) between either of the two video cards in response to whichever video card is currently handling the higher processing load. Thus, the number of allocated lanes to either card can be changed automatically (i.e., distributed) to accommodate, for example, large bursts of data being sent by a particular one of the video cards. (See Applicants' specification at par. 0060).

The other prior art references presently cited against the claims, Stufflebeam and Grimaud, also do not teach this aspect of the invention. Therefore, as all independent claims contain similar limitations regarding the use of a switch to create distributed links to allocate lanes from the interconnect, withdrawal of the rejection of all claims is warranted, and respectfully requested.

Further, independent reconsideration is requested with respect to various dependent claims, including claims 3, 7, and 29. Regarding amended claim 3 (and new claims 53 and 55), the Office Action asserts that Levy discloses an interconnect comprising a x16 connection, and wherein the switch (116, Figures 3) distributes bandwidth from the x16 connection to two x16 video card slots [0001, 0021, 0017, 0018, 0016]. However, Levy does not provide a switch that dynamically distributes (as opposed to merely splits) the bandwidth as recited in claim 3. Therefore, withdrawal of the rejection of claim 3 (and allowance of similarly written new claims 53 and 55) is respectfully requested.

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Similarly, dependent claim 7 as amended (as well as new claims 54 and 56) describes using the switch to distribute 24 lanes from the interconnect dynamically during operation of the motherboard into one x8 and one x16 connection. This makes claims 7, 54, and 56 further distinguishable from the prior art, as no reference teaches the use of distributed links in this manner to dynamically allocate lanes. These claims thus should be indicated as being allowable over the prior art.

With regard to claim 29, the Office Action asserts that Levy discloses that the interconnect comprises a first x16 connection to the first video card slot and a second smaller-scaled connection to the second video card slot [0001, 0016]. Levy does not a second smaller-scaled connection to the second video card slot as recited in claim 29. Therefore, withdrawal of the rejection of claim 29 is respectfully requested.

Therefore, withdrawal of the rejection of claims 1, 3-7, 29-34, 41, 42, 44-48 and 50-52 under 35 USC §103 (a) and an indication of allowability of all claims is respectfully requested.

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CONCLUSION

In view of the foregoing, Applicants respectfully request the reconsideration and the timely allowance of the pending claims. Should the Examiner feel that there are any issues outstanding after consideration of this response, the Examiner is invited to contact Applicants' undersigned representative to expedite prosecution.

If there are any other fees due in connection with the filing of this Response and Amendment that have not been paid or otherwise authorized for payment by a concurrently filed transmittal document or other such filing, please charge the fees to our Deposit Account No. 50-1349. If a fee is required for an extension of time under 37 C.F.R. § 1.136 not accounted for above, such an extension is requested and the fee should also be charged to our Deposit Account.

Respectfully submitted,

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